

Appendix B. Dynamic Versus Static IP Addresses

Here we describe dynamic and static IP addresses, discuss their uses, and list advantages and disadvantages associated with each type.

B.1 Introduction

An IP (Internet Protocol) address uniquely distinguishes your node from any other on the internet. The address can be either dynamic or static; the differences and the pros and cons of each type are discussed below.

Most people at Fermilab use Dynamic IP addresses, known as DHCP addresses (for Dynamic Host Configuration Protocol). This is at least partly because W2K networking has been built around the use of DHCP for workstations, and DHCP provides reliable and simple TCP/IP network connections.

Servers need static IP addresses in order to provide a stable address for access by clients. To request a static IP address, submit the *Node Registration Form* at <http://miscomp.fnal.gov/misnet/cgi/nwsvc.pl>.

For both types of IP addresses, the W2K domain sets your machine address to *machinename.fermi.win.fnal.gov*. Your OU admin needs to reset it to *machinename.fnal.gov* for static, or *machinename.dhcp.fnal.gov* for DHCP.

B.2 Dynamic IP (DHCP) Address

Each time a DHCP client boots, it sends out a DHCP *discover* message. All DHCP servers answer (in practice only one is set to do this at Fermilab; in the future possibly a second will be added for redundancy) with an *offer* message that includes an address which is available to the client.

The client machine typically repeats the *discover* message several times to make sure it hears from all the servers, then eventually chooses the “best” server, where what is “best” is up to the client. It may mean that the addresses the DHCP server has available offer the longest lease time. Or the client might prefer a server that provides WINS servers over one that doesn’t (the WINS servers keep track of all the clients’ and servers’ latest dynamic IP addresses).

The currently active DHCP server is configured by hand to handle and reserve IP addresses and the IP configuration information that goes with them.

Addresses are made available in an order that permits a client to have the best chance of getting back the same address it was using most recently. To this end, the DHCP server offers its *least recently used* address to a new client.

Once the client chooses a DHCP server, it “officially” requests the IP address and configuration information. In addition to this, it receives a lease time for the address. This lease time is not absolute. As long as it is running, the client machine requests renewal of the lease. This is invisible to the user, although there is a mechanism for the user to release the address early (**ipconfig/release** from the command prompt) or to renew it (**ipconfig/renew**).

Client machines in the FERMI domain typically access multiple file servers, print servers, and so on. The clients as well as the servers may change their IP addresses. Via the WINS servers, this is transparent to the user.

Advantages

- 1) All the IP configuration information gets automatically configured for your client machine by the DHCP server.
- 2) If you move your client machine to a different subnet, the client will send out its discover message at boot time and work as usual. However, when you *first* boot up there you will not be able to get back the IP address you had at your previous location regardless of how little time has passed.
- 3) DHCP can be used with Kerberos authentication; just be aware that any time your address changes, you’ll need to reauthenticate to Kerberos. This is true for the FERMI (W2K) domain as well as for the FNAL (UNIX) domain if you’ve logged onto a remote UNIX host.

Disadvantage

Your machine name does not change when you get a new IP address. The DNS (Domain Name System) name is associated with your IP address and therefore *does* change. This only presents a problem if other clients try to access your machine by its DNS name.

B.3 Static IP Address

If you have requested a static IP address on the *Node Registration Form*, you need to wait for the reply with all the information you need to use for configuring your server machine. Once you receive it, under Windows, delve down to **START/SETTINGS/CONTROL PANEL/NETWORK/PROTOCOLS** and enter the information that you received.

Configuring your machine for a static IP address requires filing for an exemption under the Fermilab Policy on Computing, see *Obtaining an Exemption from the Policy* at

<http://www.fnal.gov/docs/strongauth/html/policy.html#39728>.

Advantage

- The two names (Windows name and DNS name) are the same as each other, and neither ever changes. Other clients may therefore reliably access your machine by its DNS name.

Disadvantages

- 1) You can't move your machine to a different subnet and expect it to work. You need to reconfigure it.
- 2) If machines come and go, or are up only some of the time, static assignments are less resource-efficient (where the resource in question is the IP address itself).

